

What is claimed is:

1. A warning light comprising:
an assembly of light emitting diodes (LEDs);
a control circuit operable to drive said LEDs;
one or more environmental sensors coupled to said control circuit;
said control circuit further including:
means for receiving data and/or measurements from said environmental sensors;
means for calculating optimal operating parameters for said LEDs, based on said
environmental data and/or measurements; and
means for driving said LEDs in accordance with said calculated optimal operating
parameters.
2. The warning light of claim 1 wherein said control circuit comprises a
microprocessor.
3. The warning light of claim 2 wherein said microprocessor includes means for
communicating over a network.
4. The warning light of claim 3, wherein said microprocessor performs said
calculations using a lookup table.
5. The warning light of claim 1 wherein said means for driving includes an inductive
excitation circuit allowing the device to operate from a wide range of electrical supply
voltages.
6. The warning light of claim 5 wherein said inductive excitation circuit does not
require any capacitors, rectifying diodes or resistors.
7. The warning light of claim 5 wherein said means for driving comprises a buck
boost channel, whereby a series-connected assembly of LEDs can be driven by a
voltage lower than the cumulative voltage drop across said series-connected assembly
of LEDs.

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8. The warning light of claim 5 wherein said means for driving comprises a buck down channel, whereby a series of LEDs can be driven by a voltage higher than the cumulative voltage drop across said series of LEDs.
9. The warning light of claim 1 wherein said one or more environmental sensors includes an analog-to-digital convertor used to detect and measure the electrical supply voltage, and said control circuit is operable to adjust power to said assembly of LEDs in response to the available voltage level.
10. The warning light of claim 1 wherein said means for driving comprises means for providing pulsed direct-current to said assembly of LEDs.
11. The warning light of claim 10 wherein said means for calculating adjusts the pulse timing of said assembly of LEDs.
12. The warning light of claim 10 wherein said means for calculating adjusts the pulse duration and pulse repetition rate used to excite said assembly of LEDs.
13. The warning light of claim 1 wherein said control circuit is operable to provide separate control signals to separate LED modules.
14. The warning light of claim 1 wherein said control circuit is operable to communicate with other external devices and networks.
15. The warning light of claim 14 wherein said control circuit includes means for receiving commands to alter its operation.
16. The warning light of claim 14 wherein said control circuit includes means for transmitting data from various environmental sensors.
17. The warning light of claim 14 wherein said control circuit includes means for transmitting data about its own status.

18. The warning light of claim 1, wherein said one or more environmental sensors is selected from the group consisting of:

ambient temperature;
internal temperature;
ambient light level;
emitted light level;
relative humidity;
liquid moisture;
mechanical tilt;
vibration;
physical shock;
marine wave height and period;
air pressure;
solar cell voltage;
battery voltage;
supply voltage.

19. The warning light of claim 1, further comprising a temperature sensor electrically coupled to said control circuit, and wherein said control circuit is operable to derate said LEDs with temperature.

20. The warning light of claim 1, further comprising selectively applied light-control-film to direct and focus light, rather than expensive and complex curved or circular circuit assemblies, lenses or reflectors.

21. The warning light of claim 1, wherein said warning light is polygon in cross-section, and includes light-control-film to refract light from said assembly of LEDs omnidirectionally.

22. The warning light of claim 1 wherein multi-directional light is provided, said warning light comprising a plurality of LED sub-assemblies on rigid printed circuits, said rigid printed circuits being connected to one another such that the separate LED sub-assemblies are aimed in different directions.

23. A warning light comprising:

a plurality of separate LED sub-assemblies on rigid printed circuits, attached to a base circuit board that provides both mechanical and electrical connection between the rigid circuit boards and the base circuit board, said separate LED sub-assemblies being pointed in different directions;

a control circuit operable to drive said separate LED sub-assemblies;

one or more environmental sensors coupled to said control circuit;

said control circuit further including:

means for receiving data and/or measurements from said environmental sensors;

means for calculating optimal operating parameters for said separate LED sub-assemblies, based on said environmental data and/or measurements;

and

means for driving said separate LED sub-assemblies in accordance with said calculated optimal operating parameters.

allowing the assembly of a multi-directional warning light module without the need for costly flexible or bendable circuit board materials.

24. A warning light comprising:

an assembly of light emitting diodes (LEDs);

a control circuit operable to drive said LEDs;

one or more environmental sensors coupled to said control circuit;

said control circuit further including:

circuitry for receiving data and/or measurements from said environmental sensors;

circuitry for calculating optimal operating parameters for said LEDs, based on said environmental data and/or measurements; and

circuitry for driving said LEDs in accordance with said calculated optimal operating parameters.